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ABSTRACT

A study investigated the inference strategies used by sixth grade students reading narratives, and the results were compared with the inference strategies identified as those used by skilled adult readers. Subjects, 80 sixth grade students from two Canadian urban centers were divided into two groups: 40 high-proficiency readers and 40 low-proficiency readers. Equal numbers of students were randomly assigned to read either three familiar or three unfamiliar passages and to verbalize their thinking as they constructed interpretations. Qualitative and quantitative analyses showed that young readers' inference strategies appeared to be a decomposition of those used by adults as reported in the study by A. Collins and others. While some of the subjects' inference strategies overlapped those of adults, the students appeared to use more strategies that adults subsume into one or two strategies. The results suggest that reading proficiency may compensate in instances where there is insufficient background knowledge; however, whether one has sufficient background knowledge or not makes little difference in overall performance when the level of reading proficiency is low. Moreover, particular inference strategies seem to be a manifestation of an ability to effectively use background knowledge in reading comprehension. Because adult readers come to a written work with years of reading and life experience, it is unknown whether adult inference strategies would be useful as models for young readers. (References and tables are provided; two examples of passages and a list of inference questions are appended.) (JC)

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INFERENCE STRATEGIES IN READING COMPREHENSION

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Abstract

This study identified the inference strategies used by grade six readers reading three short narratives. Differences in strategy use were studied with reading proficiency and background knowledge varied. Eighty students comprised the sample, 40 low proficiency and 40 high proficiency readers. Equal numbers of students were randomly assigned to read either three familiar or three unfamiliar passages and to verbally report their thinking as they constructed interpretations. Qualitative and quantitative analyses showed that young readers' inference strategies appeared to be a decomposition of those used by adults as reported in the work of Collins, Brown, and Larkin (1980). Two observations were made from comparisons of young readers' strategy use. The first has to do with the importance of reading proficiency and the second with the relative insignificance of background knowledge in the absence of reading proficiency. It appears that reading proficiency may compensate in instances where there is insufficient background knowledge; however, whether a reader has sufficient background knowledge or not makes little difference in overall performance when the level of reading proficiency is low. Research ideas for a more detailed working out of the complexity of the inference process are offered.

INFERENCE STRATEGIES IN READING COMPREHENSION

The work by Collins, Brown, and Larkin (1980) with skilled adult readers is often cited on the topic of inference in text understanding. They state that in order to construct a model of the text, the comprehender must identify events in the story using different problem-solving methods, figure out the goals that those methods are being used to achieve, identify whether those methods succeed or fail, bind successes to satisfy preconditions for higher goals, and relate failures to alternative plans to achieve the same higher goals (p. 387). This statement characterizes the complexity of the interacting processes involved in text comprehension.

Based on the assumption that skilled adult readers know that they must do these kinds of things, it seems reasonable to wonder whether the adult strategies are used by skilled readers of a younger age. It might also be expected that readers of different levels of proficiency at any age level would utilize different strategies in comprehending texts. Proficient readers at a given age level are both more effective and more efficient than less proficient readers at that level in utilizing the textual information and their own experiences, whether it be in inference instantiation or the prediction of information (Goodman, 1973; Tierney, Bridge, & Cera, 1978-79; Schienbein, 1978; Wilson, 1979; Reder, 1980; Bos & Tierney, 1984). It would therefore seem likely that proficient grade six readers might not process text in the same manner as proficient adult readers, and that proficient and less proficient grade six readers might also process text differently.

The adult inference strategies identified by Collins, Brown, and Larkin may represent an aggregate of processes which have become automatic for adult expert readers, just as word recognition is automatic for proficient readers but a challenging process for beginning readers. This supposition, coupled with my experiences with young readers, motivated the following question: Are the inference strategies used by adults the same as those which are used by young readers?

Specifically, this study explored the inference strategies used by grade six readers to see how they compared to those of skilled adult readers. In addition, in order to study the differences in inference strategy use within the same age level, both reading proficiency and degree of background knowledge of the grade six readers were varied.

Background

The assumption that the ability to make inferences is necessary to reading comprehension is widely accepted by reading theorists and researchers. Inference is a cognitive process used to construct meaning. It is reasoning, a step from information in the text based upon generalization, explanation, or both, to what is offered as a conclusion. Inferring in text understanding is a constructive thinking process, because the reader expands knowledge by proposing and evaluating competing hypotheses about the meaning of the text in an attempt to progressively refine comprehension.

The importance of inference in understanding even the most simple text was pointed out by Thorndike in 1917. Inference makes it possible for a reader to comprehend the information which the author presented (Goetz, 1977) and is an integral part of the comprehension of, and memory for, text (Anderson & Pearson, 1984; Bransford & McCarrell, 1974; Brewer, 1977; Harris & Monaco, 1978; Kintsch, 1986; Mason, 1984; Schank, 1975; Tierney & Spiro, 1979; van Dijk & Kintsch, 1983).

Readers' background knowledge has also been shown to be an integral factor in the comprehension of text through inference. Pearson, Hansen, and Gordon (1979) found that background knowledge had a facilitating effect on inferential comprehension. Moreover, they emphasized that it is not sufficient to have prior knowledge because a reader must also have the ability to relate it to the text. Nicholson and Imlach (1981) cautioned that while background knowledge is important, children will

learn more from texts by learning how to learn from them, by focusing on the "right elements." It seems then, that a reader must rely on knowledge of the incoming text events, and impose some type of organization on them if the text is to be understood. Furthermore, it seems that readers must not only be able, but also have the desire, to restructure, disambiguate and abstract information in order to understand text. There are thus many demands on a reader.

Other factors in inferential comprehension relate to the text. What information does the text state explicitly? How is the text organized? What information in the text is relevant? How is a reader to integrate the information in the text with that in his or her head? What problem-solving strategies do readers use to generate inferences as they construct an interpretation that seems to be the most plausible given the text information? A thorough-going theory of inference in reading comprehension will ultimately have to face up to such questions.

The present study was designed to answer the latter question. Specifically, what inference strategies are used by grade six readers as they attempt to make sense of text?

The Collins, Brown, and Larkin Theory of Text Understanding

Since the work of Collins, Brown, and Larkin (1980) provided much guidance in the conceptualization of this study, an overview of it is needed. They contend that in creating an understanding of text, readers progressively refine models of the text until they converge upon a model which seems to be the most plausible. This refinement process makes use of a number of problem-solving strategies as follows:

1. *Rebinding* occurs when a value that is bound to a variable slot leads to a conflict and thence another binding for that variable is tried by readers;

2. *Questioning a Default Interpretation* happens when readers recognize that they are not progressing in their understanding of the text so they question their use of the information by trying to come up with another interpretation;

3. *Near or Distant Shifting of Focus* comes about when readers see that they are unable to progress in their current line of thinking so they move from a question they are unable to solve to one which opens up other options;

4. *Questioning a Direct or Indirect Conflict* takes place when readers identify a conflict between interpretation which was either just made or previously made and subsequent new information;

5. *Case Analyzing and Most Likely Case Assignment* occurs when readers tentatively consider a number of alternative interpretations and then decide which seems to be the most plausible.

These strategies are the model against which young readers' protocols were examined in this study.

Verbal Reports in Reading Research

In discovering the above strategies Collins, Brown, and Larkin elicited verbal reports from subjects on their thinking processes as they interpreted text. A similar approach was used in this study. The use of verbal reports in reading research involves many considerations. There are many concerns for ecological validity in terms of the task demands, the probe procedures, the subject choices, analysis of the protocols, and the research designs. There are also questions concerning the time verbalization is elicited, the amount and kinds of information sought, and the conditions for accessing and verbally reporting on mental processes that must be taken under advisement. While it is beyond the province of this paper to speak to each of these concerns extensively, I will deal with each briefly.

Memory is an important factor in verbal reporting. Ericsson and Simon (1984) categorize verbal reports into concurrent and retrospective. Concurrent reports are given at the time the task is being performed. Thus, simultaneous demands are made for the task being performed, as well as on short-term memory for the act of reporting. Retrospective reports do not place these simultaneous demands, but depend more on long-term memory and thus may yield contaminated perceptions of the task bound up with background knowledge.

In reading research, readers must read prior to verbally reporting, which makes the procedure retrospective. However, if the reports are given while reading, then the time delay may be so small as to make the reporting essentially concurrent with reading. On the one hand, given that reading is for the most part a solitary act, it is difficult to imagine that thinking aloud for another person would not in some way interfere with the continuity of the reading process.

Accuracy of the reports depends upon how they were procured. Often probing is used to elicit more information than subjects volunteer, but more information does not necessarily imply better information. The probed information may represent considerations which would not have been part of the readers' normal reading (Afflerbach & Johnston, 1984), so a balance must be sought between the amount of information to be gathered and faithfulness to how readers would normally read. This can be achieved in a two-tiered interviewing approach such as that used in this study: Readers are first given an opportunity to say all they wish without probing; then, if necessary, specific questions are asked with care not to make them overly leading.

Despite the shortcomings and potential pitfalls in using verbal reports as data, many reading studies since the early 1950's have been done which utilized either concurrent or retrospective verbal reporting methods or modifications of them (Bereiter & Bird, 1985; Fareed, 1971; Frase, 1968; Garner, 1982; Jacobson, 1973; Kavale & Schreiner, 1979; Olshavsky, 1975; Squire, 1964; Swain, 1953). These researchers promoted the use of such techniques as a means to provide more direct information on cognitive processes than is possible using experimental-group methodologies.

Recently, Afflerbach and Johnston (1984) have supported the use of verbal reports on at least five counts: (a) their valuable role in the collection of converging data sources; (b) their veridical descriptions of cognitive process under certain circumstances; (c) the access they provide to reasoning processes underlying cognitive activity; (d) their provision of a unique and sometimes only avenue for historical or genetic analysis of mental processes; and (e) the access they provide to analysis of the affective components of reading processes. From among these advantages it is difficult to isolate those which are most relevant to this study.

While all of the above researchers would acknowledge that there is no known way to get a complete, unbiased account of what has been comprehended, there seems to be some consensus that a combined think-aloud and limited-probing-where-necessary is one of the most effective procedures available at this time for the study of comprehension processes. Furthermore, it is generally agreed among these researchers that through using verbal reports it becomes possible for researchers to obtain rich information beyond what can be obtained by studying the performance product from teacher or test questions.

Method

Subjects

The students for this investigation were sixth-graders from two Canadian urban centres, one located in the Prairies and one in the Atlantic region. They were classified by achievement test percentile scores as high proficiency readers (above the 85th percentile) or low proficiency readers (below the 50th percentile), based on their vocabulary and comprehension subtest scores on the Canadian Test

of Basic Skills (CTBS). Within each group, equal numbers of students were randomly assigned to read passages about topics familiar (background-knowledge-plus) or unfamiliar (background-knowledge-minus) to them. The familiar passages related to prairie activities and the unfamiliar ones related to maritime activities for City 1, and vice-versa for City 2. Students were informed that they would be expected to read aloud and verbally report what they were thinking as they read. Students who experienced difficulty with the oral reading of the passages were excluded from the study. All students had the option of choosing not to participate. The final samples included 80 students, 40 from each city.

Materials

The instrumentation included a set of six passages and accompanying inference and clarification questions which were specifically intended for use only when readers were not clear in their initial reports. Each passage was judged by three colleagues to ensure that key concepts and labels accurately represented the selected topics. The interrater reliabilities of these judgments were .94 or above for the six passages. The passages (see Appendix A for a copy of two of the passages, one on Skiing and the other on Fishing) were written so that explicit mention of their topics was not made until near the end. This approach allowed study of how young readers construct and evaluate interpretations near the beginning of the passages, that is, study of their reasoning strategies.

The passages classified as familiar to the urban prairie students (City 1) and unfamiliar to the urban maritime students (City 2) were about skiing, a rodeo, and grain farming. The skiing passage tells about Marty's skiing experience. The rodeo passage tells about Marty and his dad preparing to go to and attending a rodeo. The grain farming passage tells about some farmers harvesting their grain in the fall of the year. These three passages were considered familiar to the prairie students for the following reasons: The children lived in a prairie environment in which farming accounts for 80% of the economy; skiing is the most popular winter sport; and rodeos are often held throughout the year. In addition, prairie teachers were asked to write an outline of what they felt their students knew about farming, skiing, and rodeos. From the outlines and comments of the teachers, there seemed to be little question that these are three topics familiar to prairie children. Using a similar approach, a group of maritime teachers agreed that the topics would be unfamiliar to their students.

The passages classified as unfamiliar to the prairie students (City 1) and familiar to the maritime students were about fishing, randying, and a garden party. The fishing passage tells about some fishermen going ocean fishing and returning with their catch. The randying passage tells about a group of children randying, a term used to refer to snow sliding. The garden party passage tells about two girls preparing to go to and attending a garden party, an annual church fair held during the summer. The fishing, randying, and garden party passages were considered familiar to the maritime students (City 2) for the following reasons: The children lived in a maritime environment in which fishing accounts for 70% of the economy; randying is a very common winter sport; and garden parties are big events of the summer. Again, a group of approximately 30 prairie teachers were asked to read the passages and to appraise whether students in a prairie setting would be likely to have background knowledge of the topics. The teachers were unanimous in their conclusion that the content of the passages would be unfamiliar for the prairie students. Conversely, the maritime teachers felt these topics would be familiar to their students.

The following guidelines were employed in constructing the passages: (a) all six passages were written in declarative sentences; (b) each passage was constructed by first stating the general features of a situation and progressing to the more specific features; and (c) each passage was comprised of five goal structures (A to E). A goal structure is part of a story in which a particular goal or objective of the story setting or characters is specified. The final segment of each passage (F) specified the outcome of the goal introduced in the first episode, or goal structure A, of the passage. Length was controlled for the number of syntactic propositions utilized in each of the passages.

Procedure

Data collection. Initially, students were met in groups of five. A practice passage, with accompanying inference and clarification questions, was used to familiarize them with the data collection procedure and to inform them about the importance of the tape recorder. When the students appeared to understand the procedures and their preliminary questions were answered, they went back to their classes.

Subsequently, each student was met individually in a session lasting for approximately 30 minutes. Subjects were asked to verbally report what they were thinking immediately after they had read aloud each goal structure, referred to as an episode in their presence. The meetings were audiotaped and later transcribed verbatim.

The inference and clarification questions were used solely for purposes of clarification when students did not independently report making inferences or did not provide sufficient information to be understood. The thoroughness of the students' independent verbalizations of what they were thinking dictated whether any of the inference or clarification questions were needed. In cases where further clarification was deemed necessary, the following kinds of questions were asked prior to moving on to a new episode: (1) Why did you change your mind? (2) Why did you raise that question? (3) Why do you think that (indicating specifically) might happen? Was possible? (4) What do you mean by girdle (bay, heavy sea, mares' tails)?

When students had made their initial verbal reports and had answered any questions of clarification, then if they had not independently made inferences, that is, if they had restated the text information, they were asked the corresponding inference questions. This procedure was followed because it cannot be assumed that if a reader did not report on or make inferences that the reader could not or did not make them. The inference questions which accompanied the fishing passage for each of the five goal structures are provided for illustrative purposes in Appendix B.

Organization of the data. The Collins, Brown, and Larkin strategies were initially used to infer the problem-solving strategies used by the young readers in this study. Collins, Brown, and Larkin had defined the strategies in terms of adult responses on difficult-to-read passages. Using these strategies as a template for the young readers' protocols seemed to capture the essence of the children's thinking, but not all important details of it.

After repeated careful readings of the students' protocols and several attempts to assign the Collins, Brown, and Larkin strategies to those protocols, a conclusion became apparent. To use the Collins, Brown, and Larkin strategies to encode the students' protocols would be to gloss over what seemed to be intermediate strategies used by the young readers. This conclusion was tested by asking a group of research colleagues to independently rate five of the protocols. All agreed that the young readers appeared to undertake a number of strategies intermediate to those used by the skilled adult readers of the Collins, Brown, and Larkin study.

To capture the processes which young readers utilized in their text comprehension, the Collins, Brown, and Larkin strategies were redefined and some strategies added to their set. Three experienced reading researchers were asked to rate these modifications. There was unanimous agreement with the definitions which I proposed. Also, the researchers agreed that the modified set of strategies adequately represented the young readers' inference strategies. Interrater reliability on the identification of strategy use ranged from .87 to .93.

This revised strategy list was used to assign scores to the young readers' protocols. The protocols for each of the 80 students were categorized according to strategy type and frequency of occurrence for each strategy type was obtained. The analysis focused on three questions:

1. Do adult inference strategies represent those used by sixth grade readers?

2. Do low and high proficiency sixth grade readers use similar inference strategies?

3. Is there a difference in strategy use according to whether sixth grade readers are familiar or unfamiliar with text content?

Results

The presentation of results is divided into qualitative results in response to Question 1 above, and quantitative results in answer to Questions 2 and 3.

Qualitative Results

The following ten strategies were used by the young readers of this study. Each strategy will be discussed singly with examples from readers' responses. The points in the protocols where strategies are inferred are in parentheses and **bolded**. Due to the length of each student's protocol, only the most relevant segments have been extracted for presentation; however, two complete protocols are available in Phillips and Norris (1986) and Norris and Phillips (1987).

Strategy 1 - Rebinding. Strategy 1 is used when a reader suggests or hypothesizes a possible interpretation, *immediately* realizes that this interpretation conflicts with previous information, and then substitutes another interpretation. In essence, the reader binds (connects) all the information up to a point but then changes the interpretation (rebinds) to make it a better or more plausible fit.

> Example: Farming Passage
> The student having already discussed that the thresher was cutting the grain and that there were indications that the weather was getting bad says: "They're using the auger to put it into the graineries (**not the graineries but their bins**)."

In this example, the student's prior knowledge about farming was activated. Graineries are common in the prairie provinces and therefore the student was on the right track in predicting subsequent information provided by the farming passage. Having verbalized that the farmers were putting the grain in the graineries, the reader was immediately cognizant that *grainery* was not the most acceptable interpretation, since the farmers were still in the field, and substituted the more suitable term "bins." Young readers seemed to do most of their rebindings immediately, that is, to say something and at once realize it as unacceptable.

Strategy 2 - Questioning a default interpretaion and/or a direct or indirect conflict. A reader's initial interpretation may trigger a knowledge schema which the reader may or may not continue to maintain. The reader may have misinterpreted certain data and/or made incorrect assumptions based on the data available. Strategy 2 is used when subsequent information is in conflict and, rather than questioning the current interpretation, the reader questions a *previous interpretation* and/or accompanying assumptions.

> Example: Fishing Passage
> The student had thought that a group of sailors were heading out to sea after reading the first episode. After the student read Episode B, he questions his previous interpretation by saying: "They're fishermen (**not sailors like I thought**) because it says here the net was hard to pull. Also, it says that they were catching fish."

Strategy 3 - Shifting of focus. Strategy 3 is used when the immediate information cannot be readily resolved within a reader's interpretation and the reader addresses related questions which have not yet been considered.

> Example: Rodeo Passage
> The student had already thought that Marty was looking for his favorite jeans to go someplace special like to a restaurant. The next expisode told about Marty looking up at the sky and considering the clouds. The student then thought that maybe it was an outdoor type restaurant or that maybe Marty was going on a picnic. The next episode of the story states, "Marty hoped that his dad was in a good mood because he wanted him to stop by Billy's house. Marty needed to borrow Billy's glasses." At this point the student says: "I'm confused now cause why would he want to go either to a restaurant or picnic or something outside if he wanted to use glasses? **(Unless they're field glasses?)**" This indicates the reader's initial failure to resolve the need for glasses while doing something outside, and then shift of focus to raise the possibility of other sorts of glasses.

Strategy 4 - Analyzing alternatives. Strategy 4 is used when a reader does not settle on any one interpretation of the data, but raises more than one possibility and remains tentative until more information is available. Words indicating tentativeness and the recognition of alternatives such as, "probably," "maybe," "or," "might," "I think," are often used with this strategy.

> Example: Skiing Passage
> The student thought that the people were either skiing or tobogganing but when asked why Marty was scared a little, raises several alternatives: "**(Maybe he's going to do something) (or learn some lesson) (or do something he's never done before)**. Those are the things that come to my mind."

Strategy 5 - Assigning an alternate case. Strategy 5 is used when information cannot be interpreted to fit with an existing interpretation and subsequent information does not provide a solution, and the reader temporarily digresses from the ongoing interpretation.

> Example: Rodeo Passage
> The student having already talked about going on a picnic or to a party wonders about the glasses. The student then says: "He was going to a masquerade party and he wanted to wear glasses, **(Maybe they were the glasses with the big nose and moustache)**." The student abandoned this idea and continued with the rest of the story as if the interpretation had never been raised.

Strategy 6 - Confirming an immediate prior interpretation. Strategy 6 is used when a reader confirms an interpretation on the basis of information immediately following it.

> Example: Skiing Passage
> The student had already thought that the children were skiing and confirms this by referring to the word slope. The student says: "They were skiing **(because of the word slope), (I thought about winter and skiing)**.

Strategy 7 - Confirming a non-immediate prior interpretation. Strategy 7 is used when a reader considers alternate interpretations to the one already made, but on the basis of subsequent information reverts to the earlier interpretation, confirming it as the choice.

Example: Rodeo Passage
The student surmised early in the passage that Marty might be going to a fair or rodeo and later in the story confirms his thoughts: "**(It's a rodeo I know it's a rodeo now cause of the calf roping, steer wrestling, and bronco riding)**."

Strategy 8 - Assuming a default interpretation and transforming information. Strategy 8 is used when a reader makes an incorrect interpretation and then misconstrues new data presented in an attempt to confirm that interpretation in spite of inconsistencies.

Example: Fishing Passage
Upon reading the word "bay" in the fishing passage the student says, " **(They're going to The Bay to go shopping)**." The text then proceeds to tell that the net was hard to pull, that the heavy sea and strong tide made it even more difficult for the girdie, that four quintals of fish were aboard, and that the skipper saw mares' tails in the north. Yet the student maintained the men were going to a shopping centre. In this case the student made a default interpretation and transformed the data by thinking that "(the nets could be [used] to catch baby fish in the waterfalls at the shopping centre)," thereby misconstruing the information in the text to confirm her previous interpretation that the bay is a shopping centre. Also, the student did not seem to resolve how the remaining textual information would fit within the interpretation.

Strategy 9 - Withholding or reiterating information. Strategy 9 is used when a reader either is silent in response to requests for information or rephrases a previously-made interpretation without the addition of any new information.

Example: Rodeo Passage
He's getting up in the morning and like he's looking for his favorite jeans, **(well he's looking for his jeans)** and then his dad shouted he was about to leave **(like if you want to come, come now) (because I'm leaving), (so if you want to come, come now)**.

Strategy 10 - Empathizing with the experiences of others. Strategy 10 is used when a reader, through personal identification with the story, projects himself or herself into the situation and experiences another's condition. This empathizing becomes a part of the reader's interpretation without a loss of story focus or the introduction of inconsistencies with either the text or the reader's interpretation.

Example: Skiing Passage
"Marty's scared because it's his first time skiing, **(I was sure scared the first time I went)**." When asked whether Marty felt good that he didn't crash into the lineup, the student responds: "Yeah, I don't know because like ah **(if he did, like oh God, help me, like this is all my new stuff and I don't want to bend any of it or something and like he could have hurt somebody else and it wouldn't make a good run down the hill, like because he would have gone down the hill perfectly and then he comes crashing into the people in the lineup and then like they'd say 'Hey, get out of here, what are you doing?' and he'd just feel stupid)**."

The question addressed by this part of the analysis is whether the strategies used by skilled adult readers and identified by Collins, Brown, and Larkin are representative of the strategies used by sixth grade readers. The answer to the question is negative. While there is some overlap between the Collins, Brown, and Larkin strategies and the ones presented here, there are also divergences. Roughly, the main points of overlap are between the first four strategies of the young and adult reader strategies where there seems to be a one-to-one correspondence. The main points of divergence are at Strategy 5 of the Collins, Brown, and Larkin adult strategies which seems to represent as many as three, and possibly four, of the young readers' strategies, and at Strategies 8 and

10 of the young readers' strategies which were not cited in the Collins, Brown, and Larkin adult strategies. The significance of these similarities and differences will be treated more fully in the Discussion section.

Quantitative Results

These results respond to Questions 2 and 3: Do low and high proficiency sixth grade readers use similar inference strategies?; and Is there a difference in inference strategy use according to whether sixth grade readers are familiar or unfamiliar with text content?

The independent variables for the quantitative analyses were reading proficiency and background knowledge. Subjects were chosen, as described in the Method section, so that there were 40 of low proficiency (< 50 percentile on CTBS) and 40 of high proficiency (> 85 percentile on CTBS). From each of these groups, 20 subjects were randomly chosen and assigned to read passages with content familiar to them, and comprising the background-knowledge-plus group, and 20 to read passages unfamiliar to them, comprising the background-knowledge-minus group. The dependent variables were frequencies of use of each of the 10 strategies.

The mean frequency of occurrence for each strategy for both background knowledge groups and both levels of proficiency is presented in Table 1. From the table several observations may be made: Some strategies (S4 and S6, for example) are used much more often than others; some strategies (S1 and S2, for instance) are used almost equally by readers of both high and low proficiency and regardless of their background knowledge group; and some strategies (S10, for example) are more often used by high proficiency readers, regardless of background knowledge group.

[Insert Table 1 about here.]

A two-way random-effects multivariate analysis of variance was performed with level of background knowledge and level of proficiency as independent variables and the frequencies of use of the 10 strategies as dependent variables. The results of the analysis appear in Table 2. Significant interaction effects were found ($p = .001$) between background knowledge and proficiency level making the main effects uninterpretable. To analyze further the nature of this significant difference, a multiple discriminant analysis was done using the four groups defined by the possible combinations of level of background knowledge and level of proficiency: Group 1 = Background Knowledge Plus and Low Proficiency (BK+, Prof-); Group 2 = Background Knowledge Minus and Low Proficiency (BK-, Prof-); Group 3 = Background Knowledge Plus and High Proficiency (BK+, Prof+); and Group 4 = Background Knowledge Minus and High Proficiency (BK-, Prof+).

[Insert Table 2 about here.]

The multiple discriminant analysis yielded three discriminant functions, $p < .001$ for Function 1 and Function 2 and $p < .100$ for Function 3. Function 1 accounted for 60.2% of the variance accounted for by the three functions, Function 2 accounted for 31.1%, and Function 3 accounted for 8.64%.

Table 3 contains values of the three discriminant functions computed at group centroids. In order to better visualize the discriminations indicated in Table 3, two plots were made. A plot of the group centroids on F1 and F2, the two functions which jointly account for over 90% of the variance accounted for by three functions together, is shown in Figure 1. It can be seen that Function 1 makes a three-way discrimination among the groups. Scoring highest on the function is Group 3. At the other extreme are Group 1 and Group 2, whose centroids have almost identical values on Function 1. Group 4's centroid is roughly intermediate between these extremes.

Function 2 differentiates all four groups from one another. Ranking on the function is in the following order from lowest to highest centroid: Group 2, Group 3, Group 1, and Group 4.

A plot of the group centroids on F1 and F3 is given in Figure 2. It can be seen that Function 3 distinguishes among all four groups. Ranking on Function 3 from lowest to highest centroid is in the following order: Group 1, Group 3, Group 2, and Group 4.

[Insert Table 3 about here.]

[Insert Figures 1 and 2 about here.]

In order to facilitate interpretation of the above discriminations, correlations among the three discriminant functions and the ten strategy variables are presented in Table 4. Those coefficients marked '*' represent correlations > .200 in absolute value and those marked '*' represent correlations > .300 in absolute value.

[Insert Table 4 about here.]

Discussion

Discussion of Qualitative Results

Since the Collins, Brown, and Larkin strategies have served as a backdrop for this study, it is appropriate to compare those strategies to the ones herein identified. The most obvious difference is number: 5 compared to 10. It would seem important to be able to justify the need for 5 additional strategies for interpreting the young readers' thinking.

The first three of the strategies in each list are close enough to being identical as to be taken so for this purpose. The fourth Collins, Brown, and Larkin strategy was found to be difficult to operationally distinguish from the second because questioning a default interpretation may also have been seen as questioning a conflict and vice-versa. In other words, when readers question a default interpretation it seems to suggest that to do so readers must have recognized a conflict between their interpretation and subsequent information. The second and fourth Collins, Brown, and Larkin strategies are combined in Strategy 2 of the young readers' strategies.

The fifth Collins, Brown, and Larkin strategy seems to correspond in a very interesting way to the strategies identified in this study. The fifth strategy, "Case Analyzing and Most Likely Case Assignment," seems to be an amalgam of a number of strategies. Collins, Brown, and Larkin explain that their fifth strategy is a deliberate one used by adults to constrain the possible solutions to a text so that the interpretation process will converge. Adults will choose *either* the most likely case *or* the case that might constrain the interpretation the most. However, the results of this study suggest that young readers may go through as many as four strategies to arrive at a similar point of convergence of interpretation. Young readers might first raise alternatives but not choose until more information is available (Strategy 4). They might then latch on to and think about one of these alternatives temporarily (Strategy 5), if subsequent information does not allow them to choose from among the alternatives they raised. Subsequently, they might withhold comment until more information is available or just reiterate a previous interpretation they had suggested (Strategy 9). Finally, on the basis of new information, they might confirm one of the previous alternatives (Strategy 6 or Strategy 7).

The observation that adult strategies are collapsed is consistent with the view that adults likely process information faster than young readers. Young readers appear to have a more deliberate procedure than adults who seem to be guided by more automatized strategies. This is not a surprising finding and lends credibility to the conclusion which the children's protocols demanded: *The strategies identified by Collins, Brown, and Larkin, while sufficient to capture adult strategies, were not sufficiently fine-grained to capture all that the sixth graders were doing.*

This difference is consistent with differences between novices and experts on other sorts of tasks. For example, Larkin, McDermott, Simon, and Simon (1980) report that experts solve complex physics problems considerably faster and more accurately than novices do. They report the experts' problem solving as automatic, flexible, and direct and the novices' problem solving as conscious, rigid, and indirect. Morales, Shute, and Pellegrino (1985) found the same differences in older and younger children in the case of understanding mathematics word problems.

Another difference in the Collins, Brown, and Larkin adult strategies and those identified for the young readers are Strategy 8 and Strategy 10. These strategies are not cited among the adult strategies. Strategy 8, "Assuming a Default Interpretation and Transforming Information," represents instances where young readers made erroneous assumptions and then misconstrued the text information to make them fit. There is undoubtedly an extensive difference in knowledge accessible by adults to that accessible by young readers, so it may be the case that children are further into a text before they question a default assumption, whereas Collins, Brown, and Larkin indicate their second strategy, "Questioning a Default Interpretation," is for adults an important strategy in immediately recognizing conflicts. Thus, this second strategy perhaps precludes the explicit need for a strategy like Strategy 8.

Strategy 10, "Emphathizing Experiences," represents a comprehension strategy explicitly used by the young readers in this study, but one which is implicitly used by the Collins, Brown, and Larkin adults. Empathizing as an inference strategy is undoubtedly nestled with the background experiences of the adults, to the point where it is used automatically whereas it seems to be a conscious comprehension strategy for young readers.

Low and high proficiency readers have been found to differ on a number of important dimensions of reading and the differences have often been translated into pedagogical prescriptions to teach the processes of the more proficient readers to the less proficient readers. The assumption seems to be that understanding how proficient readers process text can be used to guide instructional practices for those readers who are less proficient. Such an approach might be reasonable unless the developmental gap were so wide that to attempt to teach expert strategies to novices would be ineffective.

It would seem that there might exist "bands of applicability," that is, a band of reading proficiency levels within which the kinds of strategies used by high proficiency readers becomes the goal for low proficiency readers within the same band. Cast in the light of this study, it might be inappropriate to use the strategies of expert adult readers as the basis of instruction for grade six readers, since not even the high proficiency readers in grade six are using those adult strategies.

Discussion of the Quantitative Results

The first discriminant function makes a three-way distinction among the four groups of subjects. The high proficiency readers reading material familiar to them scored highest on Function 1. Students of low proficiency, regardless of whether they were reading material familiar or unfamiliar to them, scored lowest and almost equally on the function. Students of high reading proficiency reading material unfamiliar to them received intermediate scores. Thus, for high proficiency readers, the function discriminates between those reading familiar and unfamiliar text and it distinguishes low proficiency from high proficiency readers, regardless of the familiarity with text read.

How may Function 1 be understood? The largest positive weights ordered from highest to lowest are for Strategy 10 (Empathizing Experiences), Strategy 6 (Confirming Immediately), and Strategy 3 (Shifting Focus). The highest negative weights ordered from highest to lowest in absolute value are for Strategy 8 (Assuming Defaults) and Strategy 9 (Withholding Information). Thus, readers would score high on Function 1 to the extent that they empathize with the story content, confirm their

interpretations immediately, and shift their focus to construct meaning while reading. Readers would score low to the extent that they made default assumptions and withheld information.

Thus, what we see through Function 1 is a greater tendency for high than low proficiency readers and for high proficiency readers reading familiar material to use Strategy 3, Strategy 6, and Strategy 10, and a lesser tendency for high than low proficiency readers and for high proficiency readers reading familiar material to use Strategy 8 and Strategy 9. Thus, on the assumptions that the high proficiency readers would have comprehended the texts better than the low proficiency readers, and that the high proficiency readers reading familiar text would have comprehended the texts better than the high proficiency readers reading unfamiliar text, one could infer that the use of Strategies 3, 6, and 10 promotes comprehension and the use of Strategies 8 and 9 detract from comprehension.

While, unfortunately, the assumptions of the previous sentence are tentative, some support can be given for them. Since each student read three passages, a score from 0-3 was assigned to each student to indicate the number of passages for which the main theme was discerned by Episode C (see Appendix A). This score provided a rough indicator of their comprehension, because the main themes of the passages were transparent by the end of Episode C to students who were comprehending. Generally, those readers who had not figured out what the passages were about by the end of Episode C rarely ever did. The high proficiency readers scored higher than the low proficiency readers, regardless of whether they were reading material familiar or unfamiliar to them. The high proficiency readers had a mean of 1.80 compared to a mean of 1.55 for the low proficiency readers. Thus, there is some support to suggest that scoring higher on Function 1 is associated, at least in a rough sense, with better comprehension. This fact helps interpret the efficacy of Strategies 3, 6, and 10 in aiding comprehension and Strategies 8 and 9 in detracting from it.

The strategy with the largest absolute value weighting on Function 1 was Strategy 10. Thus, if the above reasoning is justified, Strategy 10 (Empathizing Experiences) contributed more than any other strategy to students' comprehension. What is it about empathizing that makes it such a powerful strategy? The ability to empathize is a cognitive capability (Tavris, 1987), requiring a person to understand or appreciate how another person must feel (Ortony, Clore, & Collins, 1987), or might feel. Empathy seems to be defined as affective-cognitive-communicative, that is, as an ability to view the world as another sees it, to perceive information and interpret the feelings underlying it, and to give an appropriate response to show understanding (Goldstein & Michaels, 1985). Thus, the ability to empathize appears to require a sophisticated level of understanding. It seems then, that proficient readers understand text to such a degree that they are able to experience the situation portrayed. The ability to empathize in reading may thus be a strong indicator of readers' comprehension ability. This is so because in order to empathize while reading, a reader must comprehend the experience conveyed in the text, interpret the underlying feelings of the event, and give a response. That is, in order to empathize, a reader must have comprehended.

Strategy 6 (Confirming Immediately) and Strategy 3 (Shifting Focus) are the other two strategies associated with high comprehension through Function 1. It seems that comprehension was aided by being flexible in shifting attention to another aspect of the text when an impasse was reached and by progressively integrating text information with background knowledge by immediately confirming interpretations. Low proficiency readers with the advantage of background knowledge proved to have only a marginal edge over those without it, suggesting that background knowledge needs reading proficiency to empower it. This point endorses those made by Pearson et al. (1979) and Nicholson and Imlach (1981) that prior knowledge alone is insufficient for text comprehension since readers must also have the ability to use it.

Strategies 8 and 9 detracted from comprehension. When confronted with unfamiliar text, low proficiency readers tended to make incorrect associations and to misconstrue the text in attempts to "make it fit" their expectations, leading to poor comprehension. Comprehension entails avoiding this approach, as Goodman and Burke (1980) have shown. Strategy 9 (Withholding Information) seemed

to be used by low proficiency readers in the face of uncertainty. This would explain in part their poor comprehension, because it means they lacked the confidence or proficiency, or both, to risk an interpretation.

The second discriminant function makes a four-way distinction among the four groups of subjects. The high proficiency readers reading material unfamiliar to them scored highest on Function 2; students of low proficiency reading material familiar to them scored the second highest; students of high proficiency reading material familiar to them were next; and low proficiency students reading material unfamiliar to them scored lowest on Function 2. There is no general tendency, as there was on Function 1, for scoring higher on Function 2 to be associated with better comprehension. How may Function 2 be interpreted? The largest positive weights ordered from highest to lowest are for Strategy 1 (Rebinding) and Strategy 6 (Confirming Immediately). The largest negative weights ordered from highest to lowest in absolute value are for Strategy 5 (Assigning An Alternate Case) and Strategy 9 (Withholding Information). Thus, readers would score high on this function to the extent that they rebind their interpretations to fit with the story content and confirm them on the basis of information immediately following it. Readers would score low to the extent that they assign an alternate case and withhold information.

Thus, what we see through Function 2 is a tendency for high proficiency subjects reading unfamiliar material (Group 4) and low proficiency subjects reading familiar material (Group 1) to use Strategy 1 and Strategy 6 more than high proficiency readers reading familiar material (Group 3) and low proficiency readers reading unfamiliar material (Group 2); and a lesser tendency for Groups 1 and 4 than Groups 2 and 3 to use Strategy 5 and Strategy 9.

The strategy with the largest positive weight on Function 2 was Strategy 1. Strategy 1 (Rebinding) was used more by high proficiency readers without the advantage of background knowledge than any of the other groups. Intuitively, it makes sense that rebinding might occur more frequently with unfamiliar materials than with familiar materials. One speculation is that with familiar materials readers formulate the most plausible interpretation the first time, whereas with unfamiliar materials readers may make several attempts at interpretation before settling upon the most plausible one, thus requiring them to rebind more often.

Low proficiency readers reading familiar materials were the second highest users of rebinding. It seems that they may gauge their interpretations against their familiarity of the topic to monitor for a more plausible interpretation, often using Strategy 1 to do so. Given this line of reasoning, low proficiency readers reading unfamiliar materials would appear to be at a double disadvantage. They do not have the reading proficiency to compensate for the lack of topic familiarity, nor the background knowledge against which to monitor what they think or say.

Strategy 6 (Confirming Immediately) was most extensively used by high proficiency readers reading unfamiliar materials suggesting that reading proficiency may be used to compensate for inadequate background knowledge. It is a strategy used to confirm an interpretation on the basis of information immediately following it, thus enabling high proficiency readers to verify a previous interpretation.

The strategy with the largest absolute value weighting on Function 2 was Strategy 5. Thus, Strategy 5 (Assigning an Alternate Case) contributed more than any other strategy to Function 2. The reason Strategy 5 (Assigning An Alternate Case) was used the least by high proficiency readers reading unfamiliar material is difficult to explain. Strategy 5 may be thought of as a temporary digression from the ongoing interpretation. Such a strategy may be something every reader does when textual information triggers a personal bias or anecdote while reading and, as can be seen in Table 1, was used by all readers. One hypothesis is that high proficiency readers reading unfamiliar material may be more attentive to the text because they are sensitive to their unfamiliarity with the topic, and therefore are less likely to digress. Less proficient readers reading familiar materials also tended to use Strategy 5 to a lesser extent than Group 2 and Group 3. A speculation here is that less proficient

readers were attempting to capitalize upon their background knowledge to compensate for their low reading proficiency and in so doing, were concentrating their energies on the immediate reading task with little room for digression. On the other hand, high proficiency readers reading familiar material (Group 3) may be comfortable enough with the text and topic to temporarily digress without risking a loss of meaning. Low proficiency readers reading unfamiliar materials (Group2) are doubly disadvantaged, so perhaps any trigger of a familiar thought would be a welcome reprieve under such circumstances, and might account for why they used it more than any other group.

Table 1 shows that high proficiency readers reading familiar material were least likely to use Strategy 9, that is, to withhold or to reiterate information, possibly because it would be unlikely that they would be void of information when reading material familiar to them and at a reading level within their level of proficiency. Thus, it seems they would have little purpose to withhold or to reiterate information. On the other hand, low proficiency readers reading unfamiliar materials were most likely to use Strategy 9, perhaps as a way to signal difficulty with the task and maybe as an avoidance strategy, rather than as an inference strategy when used in this way. Thus, although Function 2 does not assist in associating particular strategy use with better comprehension, it does help us understand the strategies which different groups of students faced with different types of reading situations are likely to use. The question of the strategies they *should* be using must be left for further study.

The third discriminant function accounts for 8.64% of the variance accounted for by the three functions together. Thus, as can be seen in Figure 2, it does not show much differentiation among the groups. However, there is a rough discrimination. High proficiency readers reading material unfamiliar to them scored highest on Function 3; students of low proficiency reading material unfamiliar to them scored second highest; high proficiency readers reading material familiar to them were next; and low proficiency readers reading material familiar to them scored lowest on Function 3.

The largest positive weights on Function 3 ordered from highest to lowest are for Strategy 8 (Assuming Defaults) and Strategy 3 (Shifting Focus). The largest negative weights ordered from highest to lowest in absolute value are for Strategy 9 (Withholding Information), Strategy 7 (Confirming a Non-Immediate Prior Interpretation) referred to in Table 1 and Table 4 as Confirming Subsequently, and Strategy 2 (Questioning Defaults). Thus, readers would score high on Function 3 to the extent that they made default assumptions and shifted focus when they recognized that an interpretation did not fit. Readers would score low to the extent that they withheld or reiterated information, subsequently confirmed an interpretation and questioned a previous interpretation. Generally, there is a greater tendency for readers reading unfamiliar material, regardless of level of proficiency to use Strategy 8 and Strategy 3 than readers reading familiar material, and a lesser tendency to use Strategy 2, Strategy 7, and Strategy 9. In addition, according to the rough indicator of comprehension discussed under Function 1, there was very little difference in the overall comprehension of the background-knowledge-plus and background-knowledge-minus on identifying the general theme of what each passage was about, 1.70 and 1.65 respectively, unlike the high proficiency and low proficiency groups. Thus, like with Function 2, scoring higher or lower on Function 3 cannot be directly associated with better or worse reading comprehension. We can, however, examine the pattern of each group.

The strategy with the largest positive weight on Function 3 is Strategy 8 (Assuming Defaults). One explanation is that when reading familiar and unfamiliar materials it seems reasonable that readers would capitalize upon what they already know to assist them in their interpretation. When the materials are familiar, it is more likely that default assumptions would be correct, but when reading unfamiliar materials the odds of the default assumptions being correct would be reduced. However, default assumptions, once made, are difficult to relinquish even when faced with ample counterevidence. It seems people will point to scant positive evidence to sustain their interpretation even though substantial negative evidence exists to suggest otherwise (Holland, Holyoak, Nisbett, & Thagard, 1986). Therefore, when reading familiar materials, since the default assumptions would more than likely be correct, no problem would be created because there is no issue of

counterevidence. On the other hand, when reading unfamiliar materials more of the readers' default assumptions would be incorrect and hence be faced with counterevidence from the text which they either tend to ignore or misconstrue to advantage (Strategy 8).

The second highest positive strategy on Function 3 is Strategy 3. On Function 1, Strategy 3 was used the most often by high proficiency readers reading material familiar to them, whereas on Function 3 it is used the most by high proficiency readers reading unfamiliar materials followed by low proficiency readers reading unfamiliar materials. This interaction is another instance pointing to the importance of knowing why particular strategies are used and under what conditions. Why Strategy 3 was used the most on Function 3 by the two groups of readers reading unfamiliar materials, regardless of proficiency level, is perplexing. When Strategy 3 is studied in conjunction with Strategy 8, it makes some sense to expect that high proficiency readers reading unfamiliar materials to shift their focus more frequently than high proficiency readers reading familiar materials because they made default assumptions which turned out to be erroneous. Consequently, they had to shift their focus more frequently in order to continue construction of their interpretation. Low proficiency readers reading unfamiliar materials would likely shift their focus as a result of latching on to any piece of information which might make sense to them.

Strategies 2, 7, and 9 are negatively weighted in Function 3. Strategy 2 (Questioning Defaults) and Strategy 7 (Confirming Subsequently) do not have significant weightings on either Function 1 or Function 2, yet the two strategies are most often used by high proficiency readers reading material familiar to them, and intuitively they appear to be reasonable strategies to use because they are an indication of comprehension monitoring.

The foregoing discussion of the quantitative results on Functions 1, 2, and 3 point to the complexity of the interactions among reading proficiency, background knowledge, and strategy use. The quantitative results suggest that how we understand the strategies depends upon how they are used. While it was not the purpose of this research project to study the quality of the inferences made by young readers, evidence from the discriminant analyses points to differences in strategies used by readers of low and high proficiency reading familiar or unfamiliar reading material which can be loosely tied to differences in the quality of interpretations, especially when examining Function 1. These results also suggest the importance of knowing what strategies are used, why they work, and under what conditions. For instance, Strategy 3 (Shifting Focus) was used the most by high proficiency readers reading familiar material. But this fact is of little use without also knowing to what end, when, and how it is to be used. Another example of a strategy which is important to understand when and how it is to be used is Strategy 10, empathizing experiences which could on some occasions be effective, and on others ineffective. Consider a case where a reader allows background knowledge to override the text information, where a strong personal bias leads a reader off track. In such a case, it seems that empathizing from experience might not be a beneficial strategy to use. Thus, effective strategy use seems to be contingent upon knowing when and how to use it.

It is important to acknowledge that use of any one or another of these strategies may vary with the particular context for which it is required since reading purposes vary widely. Furthermore, certain strategies may be better for some people and other strategies better for others as there may be several roads to comprehension. In the end, the important issue is whether interpretations are consistent and complete in response to the text.

Conclusion

This study identified differences in the inference strategies used by adult readers and those used by young readers; in the inference strategies used by high proficiency and low proficiency sixth grade readers; and, differences in the inference strategies used when young readers read familiar or unfamiliar material. While these findings are consistent with previous research on related measures of reading performance, they do flag at least two important distinctions. The first distinction has to

do with the importance of reading proficiency and the second with the relative unimportance of background knowledge in the absence of reading proficiency. It appears that reading proficiency may compensate in instances where there is insufficient background knowledge; however, whether one has sufficient background knowledge or not makes little differenece in overall performance when the level of reading proficiency is low. It seems then, that reading proficiency is a necessary condition for overall performance while background knowledge is not.

It is important to be able to adapt to unfamiliar situations in life and to unfamiliar texts in the case of reading. Readers are never going to have all the necessary background knowledge to deal with all new situations, so it seems that the development of strategies to make effective use of existent knowledge is of critical importance. How background knowledge is organized and applied in new situations is an area about which little is known (Spiro, Vispoel, Schmitz, Samarapungaven, & Boerger, 1987). This statement is significant in light of the findings of this research, since an underpinning of most current theories of reading comprehension rely upon the activation and application of background knowledge (Phillips & Walker, 1987). The results of this study suggest that the activation and application of background knowledge seems to be inextricably bound up with reading proficiency. Particular inference strategies seem to be a manifestation of an ability to effectively use background knowledge in reading comprehension. Reading comprehension is an extremely complex act, an act about which much is to be learned at all developmental levels.

The difference in the adult and young readers' strategies may be summarized as conceptual, where adult readers have a greater breadth and depth of understanding of reading comprehension than do the young readers. Such breadth and depth is the product of years of reading and other life experiences, it seems then that an important question is whether educators ought to be looking to the strategies of expert readers as models for teaching novice or young readers since it is not known whether conceptual knowledge may be taught. These queries and others, such as how readers know what information to use, when to use it, and to what degree, highlight areas for research and strengthen the need for continued study of reasoning at all developmental levels in order to develop a comprehensive picture of such an important cognitive process as inference in reading comprehension.

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Footnote

[1]In Canada, "The Bay" in a context like this refers to the Hudson Bay Company, a large department store chain.

Table 1

Mean Frequency of Strategy Use by Background Knowledge and Proficiency Levels

Strategy	Background Knowledge Plus		Background Knowledge Minus	
	Low Prof.	High Prof.	Low Prof.	High Prof.
S1 Rebinding	1.30	.85	.65	1.50
S2 Questioning Defaults	3.85	4.85	3.95	3.45
S3 Shifting Focus	1.20	6.25	2.90	3.65
S4 Analyzing Alternatives	23.10	33.20	28.15	27.85
S5 Assigning Alternates	3.70	5.25	5.95	2.15
S6 Confirming Subsequently	86.55	103.25	76.05	94.10
S7 Confirming Nonimmediat	3.15	3.60	3.30	1.85
S8 Assuming Defaults	13.60	6.70	13.95	14.95
S9 Withholding Information	18.30	14.45	19.35	14.70
S10 Empathizing Experiences	.40	3.60	.15	1.65

Table 2

MANOVA Summary Table: Background Knowledge by Reading Proficiency

Effect	DF	Approx. F	Wilks' Lambda	Sig. of F
Background Knowledge	1	5.97	.523	.000
Proficiency	1	6.87	.494	.000
BK X Prof	1	3.41	.663	.001
Within Cells	76			

Table 3

Canonical Discriminant Functions Evaluated at Group Centroids

Group	Function 1	Function 2	Function 3
Group 1 (BK+, Prof-)	-0.852	0.519	-0.646
Group 2 (BK-, Prof-)	-0.929	-1.246	0.206
Group 3 (BK+, Prof+)	1.980	-0.262	-0.125
Group 4 (BK-, Prof+)	-0.199	0.988	0.566

Table 4

Correlations between Functions 1, 2, 3, and Strategies 1-10

Strategy	Function 1	Function 2	Function 3
S1 Rebinding	-0.059	0.392**	0.045
S2 Questioning Defaults	0.191	-0.147	-0.224*
S3 Shifting Focus	0.380**	-0.095	0.370**
S4 Analyzing Alternatives	0.213	-0.122	0.255*
S5 Assigning Alternates	0.063	-0.448**	-0.207*
S6 Confirming Immediately	0.450**	0.341**	-0.002
S7 Confirming Subsequently	0.049	-0.150	-0.259*
S8 Assuming Defaults	-0.449**	0.165	0.373**
S9 Withholding Information	-0.235*	-0.223	-0.279*
S10 Empathizing Experiences	0.597**	0.130	0.169

* = >.200
** = >.300

Figure Captions

Figure 1. Plot of Group Centroids on Functions 1 and 2.

Figure 2. Plot of Group Centroids on Functions 1 and 3.

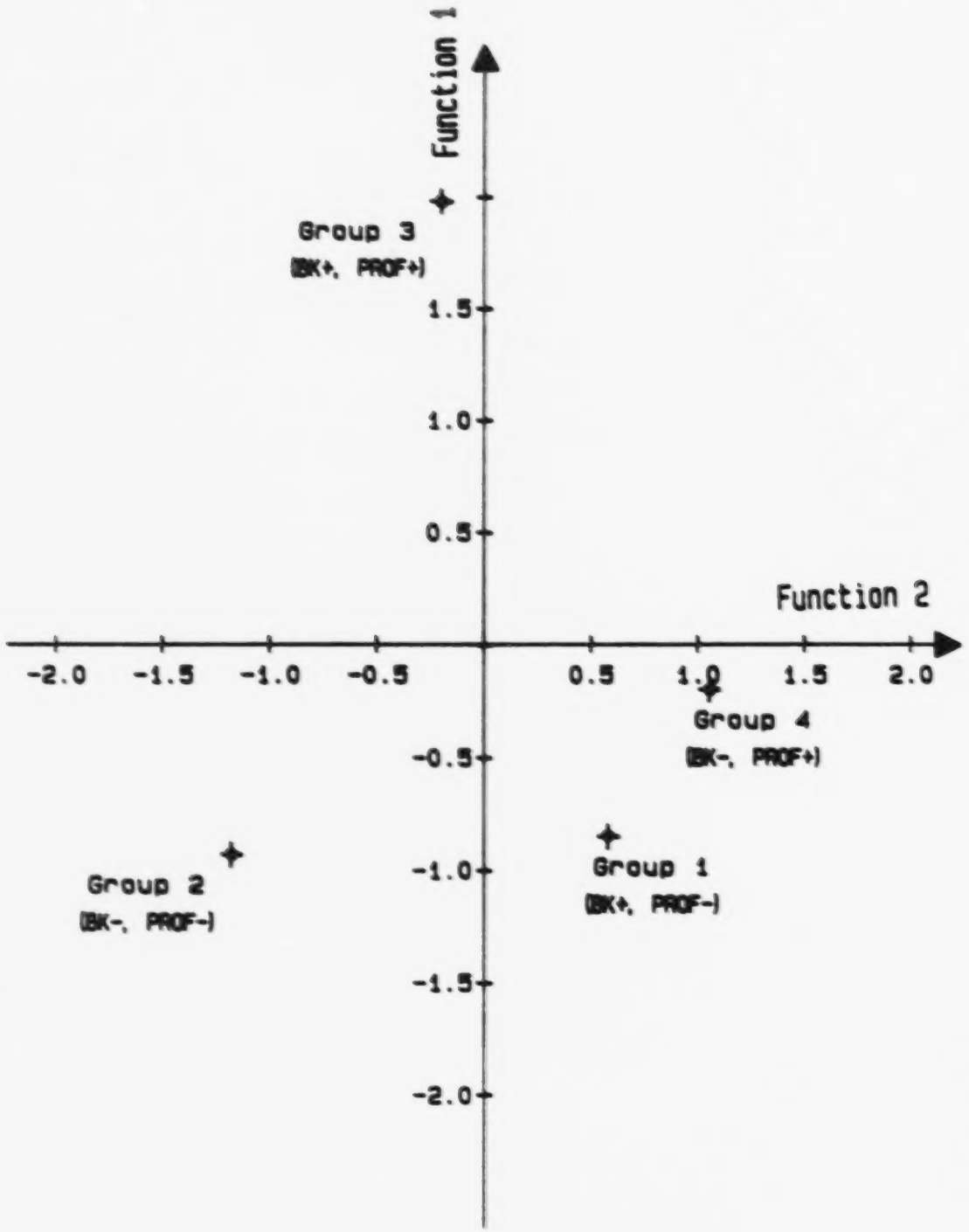
Function 1
Group 3
(BK+, PROF+)
1.5
1.0
0.5
Function 2
-2.0
-1.5
-1.0
-0.5
0.5
1.0
1.5
2.0
Group 4
(BK-, PROF+)
-0.5
Group 1
(BK+, PROF-)
Group 2
(BK-, PROF-)
-1.0
-1.5
-2.0

Figure 1

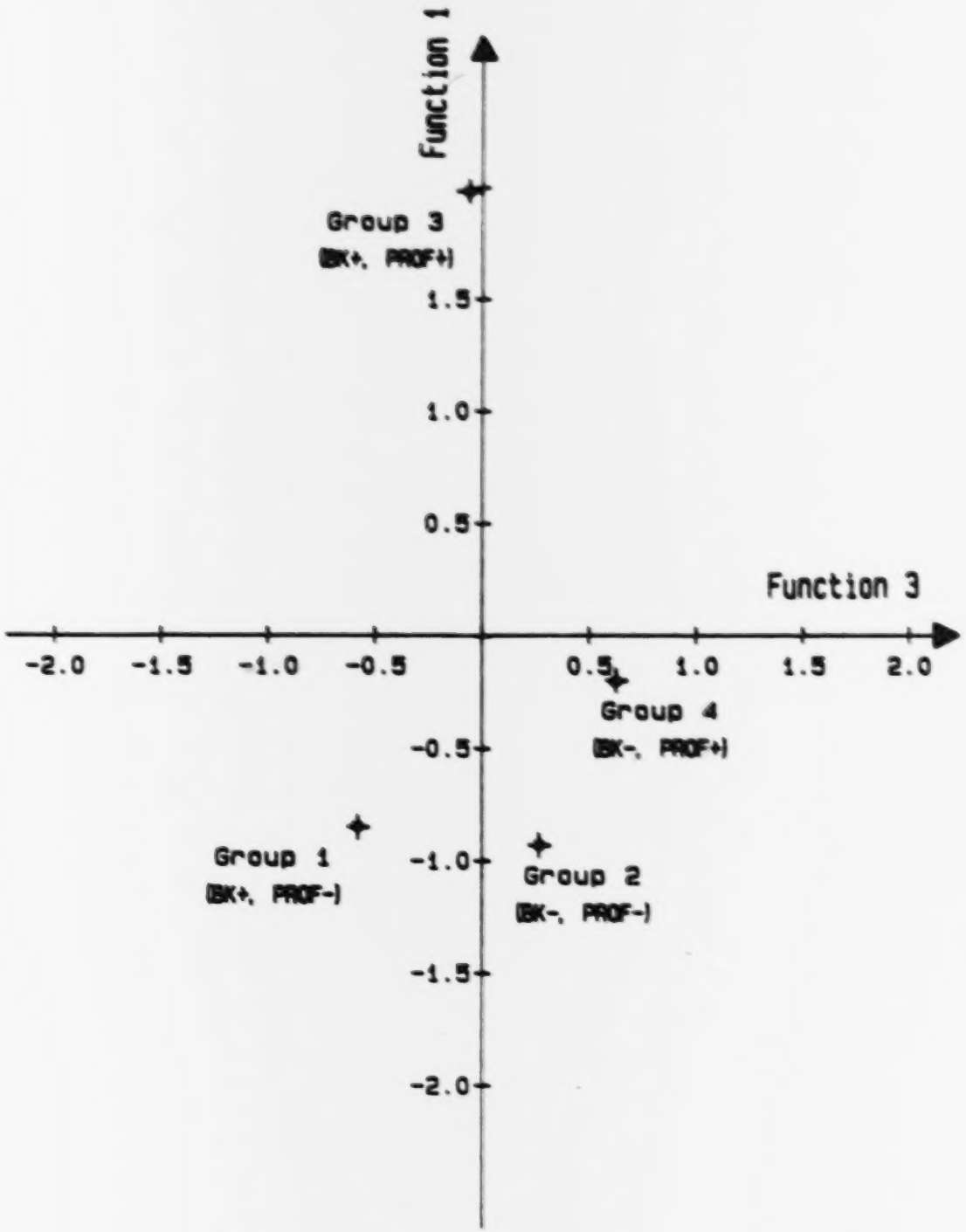
Function 1
Group 3
(BK+, PROF+)
1.5
1.0
0.5
Function 3
-2.0
-1.5
-1.0
-0.5
0.5
1.0
1.5
2.0
Group 4
(BK-, PROF+)
-0.5
Group 1
(BK+, PROF-)
-1.0
Group 2
(BK-, PROF-)
-1.5
-2.0

Figure 2

APPENDIX A

Two Examples of Passages

Skiing (Students did not see title)

A. The slope was covered with people. But there was room for lots more. B. Marty's heart pounded with excitement as he raced past the chalet to join them. He was scared a little. C. He had all new gear. He was anxious as he waited in line for the chairlift. He checked his boots and bindings. D. The run was steep and had powder snow at the top. Marty dodged and weaved every mogul without a wipeout. E. The steel edges saved him from crashing into the lineup. F. Yes, skiing is a good way to spend a winter's day.

Fishing (Students did not see title)

A. The stillness of the morning air was broken. The men headed down the bay. B. The net was hard to pull. The heavy sea and strong tide made it even more difficult for the girdie. The meshed catch encouraged the men to try harder. C. With four quintals abroad, the men were now ready to leave. The skipper saw mares' tails in the north. D. They tied up to the wharf. They hastily grabbed their prongs and set to work. The catch was left in the stage while they had breakfast. E. The splitting was done by the skipper. The boys did the cutting and gutting. F. Catching fish is filled with risk.

APPENDIX B

Inference Questions Used to Accompany the Fishing Passage

A. 1. Where were the men? 2. Where were they going? 3. What questions come to your mind? So where do you think they were going?

B. 1. Why was the net hard to pull? 2. Why was it important for them to pull the net? 3. What questions come to mind? So where do you think they were going?

C. 1. What was the nature of their cargo? 2. Why were they worried about the mares' tails? 3. What questions come to mind?

D. 1. Why did they tie up to the wharf? 2. Why was the catch unloaded with prongs? 3. What questions come to mind?

E. 1. If A(2) is not answered--where were they going? Why? 2. What kind of fish do you think they had? 3. What do you think they did with the fish?

F. So were you on track about where the men were going?